

# PATENT ABSTRACTS OF JAPAN

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(71)Applicant : TADANO LTD  
CLARION CO LTD

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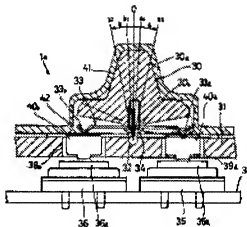
(72)Inventor : ICHINOSE MITSURU  
AKITA MASATAKE  
KASHIWABARA KAZUO

## (54) CONTROL SWITCH OF REMOTE CONTROL DEVICE

(57)Abstract:

**PROBLEM TO BE SOLVED:** To improve durability and controllability of a control switch of a remote control device for remotely controlling a working machine.

**SOLUTION:** A control switch is composed of a pair of tact switches 35, 36, and an elastic body (plate spring 33) having an energizing force stronger than a spring resetting force of the tact switches is interposed between the switch control part of a control lever 30 and working elements of the pair of the tact switches 35, 36, to thereby enlarge a reserved control stroke of the control lever 30 from the state where the tact switch 35 or 36 is turned to the ON state by the maximum control of the control lever 30 to the state where the tact switch 35 or 36 is turned to the OFF state by the reset control of the control lever 30.



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## CLAIMS

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[Claim(s)]

[Claim 1] In an operation switch of a remote control constituted so that on-off operation of the operation switch might be carried out by oscillation operation to both directions of a control lever and a work machine could be operated by remote control with a manipulate signal from the operation switch concerned, constitute said operation switch from a tact switch of a short couple of an operating stroke, and, an elastic body which has bigger energizing force than spring returning force of the tact switch concerned is infixed between operation members of a switch operation part of said control lever, and a tact switch of said couple, an operation switch of a remote control enlarging a margin operating stroke of a control lever until it carries out restoring operation of the control lever concerned from a state [ one / carried out maximum operation of said control lever, and / a state / a tact switch ] and a tact switch turns off.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]The invention in this application relates to the operation switch of the remote control constituted so that the various actuators for a work machine drive could be operated by remote control.

[0002]

[Description of the Prior Art]In work machines, such as a mounted formula crane, what was constituted so that the various actuators for a work machine drive could be operated by remote control from the distant place using the manipulate signal generator called radio control and a remote control is used.

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**TECHNICAL FIELD**

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[Field of the Invention]The invention in this application relates to the operation switch of the remote control constituted so that the various actuators for a work machine drive could be operated by remote control.

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**PRIOR ART**

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[Description of the Prior Art]In work machines, such as a mounted formula crane, what was constituted so that the various actuators for a work machine drive could be operated by remote control from the distant place using the manipulate signal generator called radio control and a remote control is used.

[0003]As the manipulate signal generator 1 which is a final controlling element of this kind of remote control is shown in drawing 4, two or more operation switches 2a, 2b, and 2c and 2d are provided in the navigational panel 1a section, and the speed control lever 3 common to a reverse part is formed. In order to operate a work machine by remote control using this manipulate signal generator 1, The actuator which should operate and drive said two or more operation switches 2a, 2b, and 2c and 2d first (when a work machine is a mounted formula crane) The elastic cylinder 8 grade which carries out the elastic drive of the turning motor 4 which carries out the turning drive of the telescopic boom 3, the rise and fall cylinders 5 which carry out the said boom-hoisting drive, the winch motor 7 which winds up the hook 6 and carries out a lowering drive, and the telescopic boom 3, and its driving direction are chosen, Next, by ordering it the driving speed of the actuator which lengthened, operated and chose said speed control lever 3, it operates by remote control.

[0004]By the way, as for the conventional manipulate signal generator 1, generally, the potentiometer of the lever handling type is used as the speed control lever 3.

The toggle switch of the operation switch 2a, 2b, and the \*\*\* bidirectional operation type shown in drawing 5 as 2c and 2d is used.

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## EFFECT OF THE INVENTION

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[Effect of the Invention]Since the operation switch of the remote control of the invention in this application constituted the operation switch from a tact switch of the couple, Can raise the endurance of an operation switch substantially and, moreover, the elastic body which has bigger energizing force than the spring returning force of a tact switch is infixed between the switch operation part of a control lever, and the operation member of a tact switch, Since the margin operating stroke of the control lever until it carries out restoring operation of the control lever from the state [ one / the state / the tact switch ] and a tact switch turns off was enlarged, the operativity of the operation switch was able to be raised.

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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention]However, generally the endurance (mechanical endurance) of a toggle switch of a switch is as low as about 50,000 times, and reliability is missing as an operation switch of the manipulate signal generator used in severe environment, such as vibration, for a long time. Then, although an operation switch is changed into a tact switch with high endurance (the mechanical endurance of a tact switch is generally about 5 million times), and it constitutes so that the tact switch concerned may be operated by the control lever of a tilting operation type, and it is possible to raise the endurance of a switch, When constituted in this way, the problem like the next had arisen. That is, when a finger was slippery and the control input of a control lever decreased for a while while operating a control lever and driving the work machine, although the operator was not conscious at all, switching became off, and there was a problem that a work machine will stop. This is because switching becomes off only by the control input of a control lever decreasing somewhat very short [ the operating stroke of a tact switch ] (the operating stroke of a tact switch is generally abbreviation 0.2 mm). For this reason, when operating a control lever, even if it is beforehand operated by strong power and the control input of the control lever decreased somewhat, it is necessary to make it a switch not serve as OFF, and there was a problem that operativity was bad.

[0006]The invention in this application sets up greatly the margin operating stroke of a control lever until it carries out restoring operation of the control lever in view of the above-mentioned conventional problem from the state [ one / the state / the switch ] and a switch turns off, It aims at providing the operation switch of the remote control which raised the operativity of the operation switch.

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MEANS

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[Means for Solving the Problem]Composition like the next is used for the invention in this application as a concrete means for solving an aforementioned problem. Namely, on-off operation of the operation switch is carried out by oscillation operation to both directions of a control lever, and it is aimed at an operation switch of a remote control constituted so that a work machine could be operated by remote control with a manipulate signal from the operation switch concerned.

[0008]And constitute said operation switch from a tact switch of a short couple of an operating stroke, and. An elastic body which has bigger energizing force than spring returning force of the tact switch concerned is infixed between operation members of a switch operation part of said control lever, and a tact switch of said couple. It is characterized by enlarging a margin operating stroke of a control lever until it carries out restoring operation of the control lever from a state [ one / carried out maximum operation of said control lever, and / a state / a tact switch ] and a tact switch turns off.

[0009]By having constituted in this way, a tact switch with high endurance can be used as an operation switch, and the endurance of a switch can be substantially raised as compared with what uses the conventional toggle switch.

[0010]Since an operating physical force of a control lever is constituted so that energizing force may be transmitted to a tact switch of a couple via an elastic body set up more greatly than spring returning force of a tact switch. If a control lever is operated, first, a tact switch will serve as one and remote control of it will be attained by the same operation feeling as the conventional operation switch.

[0011]On the other hand, after the tact switch operates by operation of a control lever, it is that an elastic body infixed between operation members of a switch operation part of a control lever and a tact switch of a couple changes, and operation of a control lever is attained continuously. For this reason, an one operation of a tact switch is continued in this operation area by energizing force which energizing force more than an OFF actuation load of a tact switch was accumulated in an elastic body with operation of a control lever, and was accumulated in the elastic body concerned even if a control input of a control lever decreased somewhat for a certain reason. For this reason, it becomes unnecessary to operate a control lever by always strong power, and the operativity of an operation switch can be raised so that a switch may not serve as OFF.

[0012]

[Embodiment of the Invention]Hereafter, with reference to drawing 1 - drawing 3, the operation switch of the remote control in this application embodiment is explained.

[0013]First, based on drawing 2, the composition of the manipulate signal generator 1 is explained to an example for the radio controlling transmitter generally used as an object for mounted formula cranes. 1a is a navigational panel. The navigational panel 1a concerned is constituted by three steps of upper and lower sides, and in the lower berth sequentially from the left, The boom-hoisting operation switch 11 which carries out driving operation of the 10 rise and fall cylinders gyrating operation switch 5 which carries out driving operation of the turning motor 4, the winch operation switch 12 which carries out driving operation of the winch motor 7, and the elastic operation switch 13 which carries out driving operation of the elastic cylinder 8 are formed. These each operation switches 10, 11, 12, and 13 are used



in order to choose the driving direction, the actuators 4, 5, 7, and 8 which it is going to drive, and, [0014]The display changeover switch 17 which changes the display information of the electric power switch 15, the display for indication 16 which displays the operating status (for example, a load factor, slung load, etc. of a work machine) of a work machine, and the display for indication 16 concerned sequentially from the right is formed in the upper row of the navigational panel 1a. In the middle of the navigational panel 1a, sequentially from the left, The height regulation switch 18 regulated so that the working height of the telescopic boom 3 may not become more than a predetermined height, the phon switch 19 with which a warning sound (phon) is sounded, the hook storing switch 20 which stores the hook 6 automatically, and the crawling switch 21 which drives a work machine with crawling are formed.

[0015]The common speed control lever 22 is formed in the rear face of the manipulate signal generator 1 concerned. The speed control lever 22 concerned is used in order to order it the driving speed of the actuators 4, 5, 7, and 8 selected with said operation switches 10, 11, 12, and 13.

[0016]Said each operation switches 10, 11, 12, and 13 are constituted as shown in drawing 1. That is, 30 is the control lever formed in the reverse T shape. The control lever 30 concerned is supported pivotably by the rocking axis 32 provided in the panel member 31 which constitutes the operation panel face 1a, enabling free rocking, and in the direction of a, and the direction of b, comprises that an operator operates the final controlling element 30a so that oscillation operation is possible. The flat spring 33 in which thin length equipped both ends with the switch pressing part 33a and 33b in shape is attached to the switch operation part 30b located in the lower part of the control lever 30 concerned by the screw 34 grade. The flat spring 33 concerned is equivalent to the elastic body in claim 1 of this application, and the energizing force is set up become larger than the spring returning force of the tact switches 35 and 36 mentioned later. The flat spring 33 concerned can also be constituted from the coil springs 37 and 37 of the couple provided in the side part of the control lever 30 as shown in drawing 3 at other embodiments. It is also possible to constitute from elastic bodies (not shown), such as sorbo rubber, instead of said coil springs 37 and 37.

[0017]The tact switches 35 and 36 of the couple which constitutes a switch are attached to the switch mounting board 38 which carried out close arrangement to said panel member 31 so that it may become the switch pressing part 33a of said flat spring 33, and the physical relationship corresponding to 33b. 39a 39b is the through hole drilled by the position corresponding to the tact switches 35 and 36 of said panel member 31, and the switch press top 40a and 40b are interpolated in the through hole 39a concerned and 39b. When the switch press top 40a concerned and 40b transmit the operating physical force of the control lever 30 to the tact switches 35 and 36 of a couple via the flat spring 33, they function as an operating-physical-force transfer member.

[0018]If each operation switches 10, 11, 12, and 13 are constituted like the above and the control lever 30 is operated in the direction (a1 position) of a, If an operating physical force is transmitted to the operation member 35a of the tact switch 35 via the flat spring 33 and the switch press top 40a, and the tact switch 35 serves as one and the control lever 30 is operated in the direction (b1 position) of b, An operating physical force is transmitted to the operation member 36a of the tact switch 36 via the flat spring 33 and the switch press top 40b, and the tact switch 36 serves as one. For this reason, in both this operation area, the tact switch 35 or 36 becomes one first by operation of the control lever 30, and it can operate by remote control by the same operation feeling as the conventional switch.

[0019]On the other hand, if the control lever 30 is further operated in the direction of a (a1 a position to a2 up to a position), it can continue one, because the flat spring 33 bends, and the tact switch 35 can operate the control lever 30 (refer to the broken chain line graphic display of drawing 1). Also when the control lever 30 is further operated in the direction of b (b1 a position to b2 up to a position), it can continue one, because the flat spring 33 bends, and the tact switch 36 can operate the control lever 30. For this reason, even if the energizing force more than the OFF actuation load of the tact switches 35 and 36 is accumulated in the flat spring 33 with operation of the control lever 30 and the control input of the metaphor control lever 30 decreases somewhat in both this operation area, The tact switch 35 or the one operation of 36 is continued by the energizing force accumulated in the flat spring 33. For this

reason, it becomes unnecessary to operate the control lever 30 by always strong power, and the operativity of an operation switch can be raised so that the tact switches 35 and 36 may not carry out an OFF operation.

[0020]In drawing 1, 41 is a raintight cover which prevents storm sewage etc. from covering the circumference of the control lever 30 and invading in the manipulate signal generator 1 from 30 copies of control levers, and is a tarpaulin in which 42 prevents storm sewage etc. from invading in the manipulate signal generator 1 similarly.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1]It is an explanatory view of a 1st embodiment of the operation switch of the remote control of this invention.

[Drawing 2]It is an explanatory view of the manipulate signal generator equipped with the operation switch of this invention.

[Drawing 3]It is an explanatory view of a 2nd embodiment of the operation switch of this invention.

[Drawing 4]It is an explanatory view of the conventional remote control.

[Drawing 5]It is an explanatory view of the conventional operation switch.

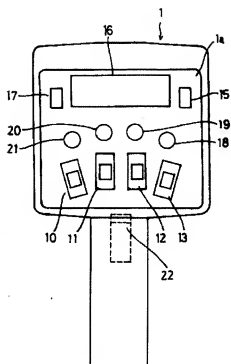
[Description of Notations]

1; manipulate signal generator, a 1a; navigational panel, 3; telescopic boom, 4; A turning motor, 5; Rise and fall cylinders, 6; hook, 7; winch motor, and an 8; elastic cylinder, 10; gyrating operation switch, 11; boom-hoisting operation switch, and 12; A winch operation switch, A 13; elastic operation switch, 22; speed control lever, and 30 : A control lever, 32; rocking axis, 33; flat spring, 35, 36; a tact switch, 35a, 36a ; An operation member, 37; coil spring, and 38; a switch mounting board, 39a, 39b ; A through hole, 40a, 40b ; Switch press top,

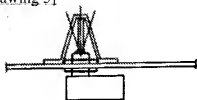
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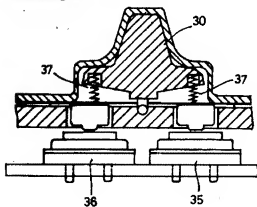




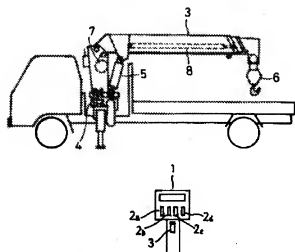
[Drawing 5]



[Drawing 3]



[Drawing 4]



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